

## QUALITY CHANGE OF HABITAT IN NORTHWESTERN LOUISIANA

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### ABSTRACT

We revisited twenty botanically significant sites in Caddo Parish that we have known for twenty or more years where important botanical collections had been made. We compared the condition of those sites twenty years ago to what they are today. We found an overall deterioration in site quality of 47% in twenty years. One site had improved in quality, one had remained the same, and eighteen had deteriorated. Most of the deterioration has been caused by urban development and agroforestry.

KEY WORDS: Louisiana, habitat deterioration, ecology

### INTRODUCTION

A recent worldwide study by the World Conservation Monitoring Center (1997) found that 12% of all vascular flora is either extinct or on the verge of distinction. The reason is habitat destruction. The *Living Planet Report 1998* produced by the World Wildlife Fund for Nature, the New Economics Foundation, and the World Conservation Monitoring Center, found that since 1970 humans have destroyed 30% of the natural world, and since 1990 the rate of destruction has increased to about 3% per year.

The overall destruction and degradation of the natural habitat of the eastern and southeastern United States have been well documented (Frost 1993; Martin & Boyce 1993; Boyce & Martin 1993; Whitney 1994; Noss *et al.* 1995). After four centuries of European presence, even the most conservative estimates of natural habitat remaining indicate its future is very precarious. Many historic plant communities have ceased to exist, and others hang in the balance. Very few examples exist in pristine condition.

The degrading of these natural communities continues. Estimates of rate of deterioration and destruction vary depending on measurement criteria. If "pristine" were taken to be the criterion, then almost none exists. If "relatively natural condition" meaning "areas that have been repeatedly cut over but retain some semblance of originality," (Louisiana Natural Heritage Program 1993) is used, then some exist, but even here very little.

Using the Louisiana Natural Heritage figures, which that agency admits to be "not very satisfactory," (Louisiana Natural Heritage Program 1993) but which are at least conservative, and combining all plant communities together, no more than 30% of Louisiana's natural communities exists in "relatively natural condition." Some communities are totally gone and others are on the brink of extinction.

An example, well documented because of economic importance, is the vast longleaf pine forests that once characterized much of the West Gulf Coastal Plain. These were reduced to 22% of their original extent by 1935, and today only 12% of that 22% remains (Outcalt 1997), most in very poor condition.

We have been botanizing in Louisiana for over twenty years. We have visited the same sites repeatedly. Because little is known about the rate of regional deterioration of the natural landscape, we decided to assess the current quality of several of these sites and compare their present condition with what it was twenty years ago.

## STUDY AREAS AND METHODS

Caddo Parish is located in the northwestern corner of Louisiana with Texas to the west, Arkansas to the north, and the Red River to the east. The parish consists of 882 square miles, measuring approximately 60 miles north-south and 15 miles east-west. The coordinates 33° N 94° W cross near the northwest corner of the parish. MacRoberts (1979) and Teague & Wendt (1994) provide information on geology, soils, climate, topography, land use history, and present and past vegetation and communities.

Present plant communities broadly fall into shortleaf pine-oak-hickory forests in the uplands and various bottomland hardwood and swamp forests along the Red River and its tributaries. Within this broad classification various natural plant communities occur, many of which are classified as rare or endangered statewide and a few of which are known now only from historical accounts (Teague & Wendt 1994; MacRoberts *et al.* 1997). Since about 1830 when Europeans first began settling the area, Caddo Parish has been intensively logged, grazed, and farmed: first along the Red River and then in the uplands. The oil and gas industry also has left its mark. The Red River is now dammed.

The study sites are scattered over the parish both north and south of Shreveport, a city of 200,000 located in the south. Three sites are in Shreveport itself. Most of the sites are in the uplands, the flood plain having been drastically altered long ago by intensive agriculture and grazing, which continues today. The sites were not chosen to

survey all community types. Also, twenty is such a small number that an analysis of relative change by community is unprofitable.

Because we did not plan this study twenty years ago, we must proceed using a rather subjective approach. However, this may not be as bad as it sounds since many of the sites are obviously destroyed and others are clearly degraded. Given this caveat, the problem remains of deciding just how changed a site is. Our criterion was to compare how a site looked today to the way it looked twenty years ago. We attempted to estimate the change in natural diversity, change in size, and change in overall condition. If a site has become a subdivision, we gave it a -100% score. If it was a hardwood forest twenty years ago and now is a clearcut, site-prepared loblolly pine plantation, it also received a -100%. If it has become an overgrown tangle because of fire suppression, we considered it only marginally changed. If it has been criss-crossed with roads preparatory of a subdivision, we estimated damage at the present time.

None of the sites were undisturbed when first visited; at best, all were in "relatively natural condition." So we are not talking about the rate of change from a pristine or pre-European condition but from a condition twenty years ago, whatever that condition was. Twenty years ago these areas were some of the best sites for the local flora.

All sites used in this sample were chosen not only because we had first-hand knowledge of them but because they had been the sites of important collections of rare Louisiana species, for example, *Astragalus soxmaniorum* Lundell, *Ceanothus herbaceus* Raf., *Dentaria laciniata* Muhl. ex Willd., *Draba cuneifolia* Nutt. ex Torr. & Gray, *Erythronium albidum* Nutt., *Coreopsis intermedia* Sherff, *Dalea villosa* (Nutt.) Spreng. var. *grisea* (Torr. & Gray) Barneby, *Dalea phleoides* (Torr. & Gray) Shinnery, *Erythronium longifolium* Nutt., *Isotria verticillata* (Muhl. ex Willd.) Raf., *Mirabilis albida* (Walt.) Heimerl, *Penstemon murrayanus* Hook., *Phacelia strictiflora* (Engelm. & Gray) A. Gray, *Platanthera lacera* (Michx.) G. Don, *Polygonella americana* (Fisch. & Mey.) Small, *Psoralea subulata* Bush, *Quercus arkansana* Sarg., *Ribes curvatum* Small, *Selaginella arenicola* Underw. subsp. *riddellii* (Van Estelt.) R. Tyson, *Tetragonotheca ludoviciana* (Torr. & Gray) A. Gray ex Hall, *Trillium recurvatum* Beck, *Trillium texanum* Buckl., *Zigadenus nuttallii* (A. Gray) S. Wats., and *Zornea bracteata* J.F. Gmel. (MacRoberts 1979; MacRoberts 1989; Thomas & Allen 1993-1998; Louisiana Natural Heritage Program 1995). A number of these are (or have been) ranked as Federal candidate species, and most are ranked as state rare or endangered.

For this analysis, we visited the sites in the spring of 1998 and assessed their current quality.

## RESULTS

Table 1 summarizes the survey results of the twenty Caddo Parish sites examined in this study.

Table 1. Site name, location, percentage change, and reason for change.

Site	Change %	Location and Condition
1)	-50	T17N R14W Sec. 13. Betty Virginia Park hardwood bluff. Land cleared.
2)	-90	T16N R13W Sec. 16. <i>Psoralea</i> sandylands. Land cleared and converted to lawn.
3)	-90	T17N R13W Sec. 31. Spring Lake Estates pine/hardwoods. Developed with a few lots left.
4)	-100	T16N R13W Sec. 17. <i>Platanthera lacera</i> mesic hardwood site. Subdivision, nothing left.
5)	-20	T16N R13W Sec. 30. Gowan Place calcareous prairie remnant. Fire suppressed and overgrown.
6)	0	T15N R13W Sec. 2. Wallace Lake Dam riparian. Corps of Engineers dam area. Federal land.
7)	-50	T16N R13W Sec. 7-8. YMCA Camp pine/hardwoods. Pines removed.
8)	-50	T16N R13W Sec. 6. Ellerbe Rd. pine/hardwoods. Half developed as sub-division.
9)	-20	T22N R15W Sec. 22. <i>Erythronium</i> pine/hardwoods. Land scraped, roads for subdivision.
10)	-30	T22N R15W Sec. 14. Bluff hardwoods. Some lumbering.
11)	-100	T23N R15W Sec. 26. Red House sandylands. House and yard on site.
12)	-100	T22N R16W Sec. 11. Kendrick Road sandylands. House and yard on site.
13)	-20	T23N R15W Sec. 26. Ida sandylands. Shrub encroachment, fire suppression.
14)	-50	T22N R15W Sec. 4. <i>Isotria</i> place. Mesic pine-hardwoods. Pines cut out, site trashed.
15)	-40	T23N R16W Sec. 21. <i>Quercus arkansana</i> sandylands. Fire suppression and grazing.
16)	-100	T22N R15W Sec. 33. <i>Trillium</i> mesic hardwoods. Hardwood riparian, clearcut, pine plantation.
17)	-50	T21N R16W Sec. 16. <i>Talinum</i> sandylands. Clear cut, some some hardwoods left.
18)	-20	T21N R16W Sec. 23. Roger's Station sandylands. Bulldozer scrapings.
19)	+50	T18N R13W Sec. 32. V.A. Hospital hardwood bluff. Understory opened and overstory left. Federal land.
20)	-10	T18N R13W Sec. 31. Greenwood Cemetery <i>Zigadenus</i> site. Mowed prairie with grave encroachment.

Average -47

## DISCUSSION

Of the twenty sites, eighteen have deteriorated in twenty years, one has remained the same, and one has improved. Four sites had been totally destroyed. The deterioration is 47% overall or an average of about 2.3% per year. Applying a simple Sign Test to these data indicates that the probability of obtaining this distribution is  $p < .001$ , with the direction of change for the botanical worse.

Bridges (1988:4), in his study of longleaf pine savannas in southwestern Louisiana, found that "perhaps as many as ten percent of the total areas identified had lowered in quality during the intervening  $2\frac{1}{2}$  years due primarily to timber management," a figure not dissimilar to that reported here. Bridges (1988:4) gives what he calls an "extreme example," one which he says undoubtedly has been repeated countless times over the last few decades: "a longleaf pine savanna which had fairly large trees on the aerial in 1985, was good quality and maintained by fire when driven by in 1987, on April 11, 1988 it was noted that the site had been thinned removing most trees over 12 [inches] dbh but leaving the remaining longleaf pines intact, on May 22, 1988 a species list was made of the fairly representative savanna flora of this certainly recoverable site, on May 24, 1988 during another drive-by bulldozers were pushing the remaining trees into piles and scraping the ground clean, and on June 11, 1988 the site was an open field which had been seeded for improved pasture." Four of our examples were altered to this extreme.

The Louisiana Natural Heritage (1993) gives percentage estimates of acreage remaining in "relatively natural condition" in Louisiana. They suggest that no more than 30% exists in this condition, which means that there is very little land remaining of any botanical quality whatsoever. Even accepting the above figure, which we consider to be an overestimate for northwestern Louisiana, if our data are correct, about half the natural landscape has been lost in the last twenty years.

Interestingly, neither of the federally owned sites in our study (sites 6 and 19) had deteriorated. One is a Corps of Engineers Dam at Wallace Lake, which continues to be riparian, floodplain, and pasture. It was not in "relatively natural condition" twenty years ago, but it is basically as it was then.

The other site is a bluff overlooking the Red River located on the grounds of the Veteran's Administration Hospital in Shreveport. When we first visited this site in 1977, the area had a number of rare species that were being crowded out by shrubs and vines. Today the shrub layer is cleared yearly in June and July (for non-ecological purposes such as security, snake control, and patient safety), resulting in an environment conducive to *Trillium recurvatum* and *Dentaria laciniata*.

A final point. The negative change recorded here is due entirely to anthropogenic causes: urban sprawl, agroforestry, grazing, farming, and fire suppression. None is the result of natural causes: hurricanes, tornadoes, or river course changes.

## CONCLUSION

Over most of the United States, and certainly in environmentally strained Louisiana, we are at a Rubicon in the preservation of our natural heritage. If we continue along the present path, it will be only a matter of time before our native flora is gone. At the present rate of deterioration, our natural heritage soon will exist only as Old Timers' memories and, when they are gone, as inscriptions in the dead black ink on the written page and as exsiccatae in the nation's plant mausoleums.

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